

ANNUAL SUMMARY REPORT

EPA CONTRACT NO. EP-D-05-088 - OPTION 3

REMOTE SENSING SUPPORT SERVICES

OCTOBER 8, 2009



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## ACRONYMS AND ABBREVIATIONS

AML	Arc Macro Language	RUSLE	Revised Universal Soil Loss Equation
AOC	Area Of Concern	SEDMOD	Spatial Explicit Delivery Model
APA	Aerial Photographic Analysis	SOLEC	State of the Lakes Ecosystems Conference
ATtILA	Analytical Tools Interface for Landscape Assessments	SOW	Statement of Work
C-CAP	Coastal Change and Analysis Program	STATSGO	State Soil Geographic
CD-ROM	Compact Disc-Read-Only Memory	SSURGO	Soil Survey Geographic (database)
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System	SWAT	Soil/Water Assessment Tool
DEM	Digital Elevation Model	TBD	To Be Determined
DVD	Digital Video Disc	TD	Technical Directive
EMAP	Environmental Monitoring and Assessment Program	TIR	Thermal Infrared
EPA	U.S. Environmental Protection Agency	TWP	Technical Work Plan
ERI	Environmental Research, Inc.	UMRB	Upper Mississippi River Basin
ESD	Environmental Sciences Division	USDA	United States Department of Agriculture
FEMA	Federal Emergency Management Agency	USDA ARS	USDA Agricultural Research Service
FTE	Full-Time Equivalent	USDA ASCS	USDA Agricultural Stabilization and Conservation Service
FY	Fiscal Year	USGS	United States Geological Survey
G&A	General and Administrative	USGS EROS	USGS Earth Resources Observation Systems
GCP	Ground Control Point	USGS EDC	USGS EROS Data Center
GIS	Geographic Information System	WA	Work Assignment
GLS	Great Lakes SOLEC	WAM	Work Assignment Manager
GSWS	Geological Survey Watersheds		
HSA	Historical Site Analysis		
HUC	Hydrologic Unit Codes		
LEB	Landscape Ecology Branch		
LIPS-MACS	Landscape Indicators for Pesticides Study for Mid-Atlantic Coastal Streams		
LM	Lockheed Martin		
LMES	Lockheed Martin Environmental Services		
LOF	Limitation of Funds		
LS	Length Steepness		
MAHA	Mid-Atlantic Highlands Assessment		
MRB	Missouri River Basin		
MRLC	Multi-Resolution Land Characteristics		
NAIP	National Agriculture Imagery Program		
NALC	North American Landscape Characterization		
NARA	National Archives and Records Administration		
NASS	National Agricultural Statistics Service		
NED	National Elevation Data		
NHD	National Hydrography Data		
NLCD	National Land Cover Data		
NOS	National Ocean Service		
NWI	National Wetlands Inventory		
ORB	Ohio River Basin		
QA/QC	Quality Assurance/Quality Control		
QAPP	Quality Assurance Project Plan		
R&D	Research and Development		
RSSS	Remote Sensing Support Services		

## **PROGRAM MANAGEMENT**

Lockheed Martin provided the following level of effort to this contract (EP-D-05-088) for FY 2009 (September 12, 2008 to September 11, 2009).

Total hours delivered as of 09/11/09 including subcontract hours:	16,948.0
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The following work-authorizing documents were processed:

Work assignments received from EPA	58
Final delivered as of 09/11/09	50

### TASK STATUS SUMMARY

TASK	TITLE	WA ACCEPTED	TWP APPROVED	SUBMITTED DELIVERABLE OR INACTIVE	EPA LOF
20901102S RS911020	Commerce City Street Plume, Williston, VT	09/16	10/15	12/10	\$18,601.32
20901103S RS911030	Fletcher's Paint Works and Storage Facility, NH	10/09	11/14	11/11	\$1,697.34
20901104S RS911040	Centredale Manor Restoration Project, RI	12/16	01/30	05/28	\$37,381.61
20901105S RS911050	Rhoades Salvage/ABC Metals, VT	12/16	01/30	04/28	\$26,725.02
20901106S RS911060	Olin Chemical, MA	04/07	04/30	09/11	\$50,631.52
20902402S RS924020	Cornell-Dubilier Electronics, NJ	11/05	12/17	02/20	\$26,849.17
20902403S RS924030	Schermerhorn Creek Site, NY	10/09	11/14	02/12	\$8,407.12
20902404S RS924040	PAS Irwin Dump, NY	10/09	11/14	02/16	\$5,585.61
20902405S RS924050	Laurence Harbor Seawall, NJ	10/09	11/14	12/02	\$9,719.80
20902406S RS924060	Richmond Terrace Site, NY	10/09	11/14	03/11	\$37,219.27
20902407S RS924070	General Color, NJ	10/09	11/14	05/06	\$26,522.77

<b>TASK</b>	<b>TITLE</b>	<b>WA ACCEPTED</b>	<b>TWP APPROVED</b>	<b>SUBMITTED DELIVERABLE OR INACTIVE</b>	<b>EPA LOF</b>
20902408S RS924080	Atlantic States Cast Iron Pipe, NJ	11/05	12/17	04/06	\$29,511.14
20902409S RS924090	NL Industries Site, Depew, NY	05/13	06/16	08/12	\$8,778.36
20902410S RS924100	Cinnaminson Groundwater Contamination	05/13	06/16	09/10	\$52,988.02
20902411S RS924110	Pohatcong Valley Groundwater, NJ	08/18	09/03	09/11	\$4,657.11
20902412S RS924120	General Color, Camden, NJ	08/18	08/25	08/19	\$1,168.08
20903588S RS935880	Globe Fireworks, MD	10/09	11/17	01/27	\$2,255.24
20903589S RS935890	Monumental Fireworks, MD	10/09	11/17	12/18	\$2,351.80
20903590S RS935900	Catoctin Mountain National Park, MD	10/09	11/17	04/09	\$22,129.25
20903591S RS935910	Chem Fab, PA	12/17	01/30	06/22	\$41,374.17
20903592S RS935920	Borit Asbestos Site, PA	12/17	01/30	04/14	\$44,787.64
20903593S RS935930	Globe Fireworks, MD	01/30	02/24	01/30	\$365.26
20903594S RS935940	Kellett Aircraft Corporation, PA	04/07	04/30	07/08	\$29,311.66



<b>TASK</b>	<b>TITLE</b>	<b>WA ACCEPTED</b>	<b>TWP APPROVED</b>	<b>SUBMITTED DELIVERABLE OR INACTIVE</b>	<b>EPA LOF</b>
20903595S RS935950	Port Huntington, Tri-State	05/11	06/24	09/11	\$193,899.99
20903596S RS935960	Carr China, Taylor County, WV	07/13	08/13	09/11	\$5,912.87
20903597S RS935970	Stillwater, Goshen, VA	07/13	08/18	09/10	\$6,731.11
20904540S RS945400	Sonford Products, MS	10/09	11/17	11/19	\$4,117.90
20904541S RS945410	National Fireworks, TN	10/09	11/17	11/20	\$3,093.73
20904542S RS945420	Southern Pine Wood Preserving	05/13	06/16	08/12	\$6,233.06
20904543S RS945430	Aberdeen Contaminated Groundwater, NC	10/09	11/17	12/30	\$5,931.66
20904544S RS945440	Richards Metal Plating Site, AL	04/07	04/30	06/08	\$8,594.20
20904545S RS945450	B.F. Goodrich, Calvert City, KY	07/13	08/06	08/11	\$3,440.85
20904546S RS945460	Illinois Central Railroad Johnston Yard, TN	08/18	09/03	09/11	\$4,682.58
20905621S RS956210	Atlas Powder (Dupont), MI	12/17	01/30	04/16	\$6,766.43

<b>TASK</b>	<b>TITLE</b>	<b>WA ACCEPTED</b>	<b>TWP APPROVED</b>	<b>SUBMITTED DELIVERABLE OR INACTIVE</b>	<b>EPA LOF</b>
20905622S RS956220	PMC Groundwater (a.k.a. Petoskey Municipal Well Field), MI	04/07	04/30	06/01	\$7,646.08
20906004S RS960040	Marion Pressure Treating, LA	10/09	11/17	12/05	\$2,346.43
20906005S RS960050	Van der Horst USA Corporation, TX	10/09	11/17	12/19	\$6,982.65
20906006S RS960060	Cleveland Mills, NM	03/06	04/20	05/27	\$7,114.10
20906007S RS960070	Sand Springs Petrochemical Complex, OK	03/06	04/20	06/30	\$18,800.60
20906008S RS960080	Oklahoma Refining Company, OK	03/06	04/20	07/30	\$29,612.14
20906009S RS960090	Ruston Foundry, LA	03/06	04/20	06/02	\$6,003.83
20906010S RS960100	Imperial Refining Company, OK	03/06	04/20	06/03	\$7,709.91
20907006S RS970060	Cameron Missouri Investigation, MO	10/09	11/17	03/17	\$34,131.28
20909961S RS999610	Iron King/Humboldt Smelter, AZ	09/16	10/15	12/30	\$23,401.03
20909962S RS999620	Iron King/Humboldt Smelter, AZ	01/30	02/24	02/17	\$626.19
20909963S RS999630	Santa Susana Field Laboratory, Ventura County, CA	04/30	06/10	09/11	\$79,767.49

TASK	TITLE	WA ACCEPTED	TWP APPROVED	SUBMITTED DELIVERABLE OR INACTIVE	EPA LOF
20909964S RS999640	Santa Susana – Technology Transfer	08/13	08/20	08/19	\$2,220.62
209RD006R RS9R0060	Landscape Investigations for Pesticides and Nutrients: GIS and Remote Sensing Support Landscape Investigations for Pesticides and Nutrients: GIS and Remote Sensing Support	09/12	10/15	09/11	\$56,947.49
209RD015R RS9R0150	Software Evaluation and Application of LiDAR-based Digital Elevation Models	09/12	10/16	09/11	\$128,387.87
209RD018R RS9R0180	Landscape Characterization, Mapping and Ecological Assessment of Watersheds in the Vicinity of Recreational Waters	09/12	10/16	03/30	\$133,264.85
209RD020R RS9R0200	Landscape Baseline Data Preparation - Future Midwest Landscapes	09/12	10/16	03/30	\$86,994.64
209RD022R RS9R0220	Landscape Characterization, Mapping and Ecological Assessment of Watershed Models and Wetlands in the Willamette River Basin	09/12	10/16	08/31	\$72,851.91
209RD023R RS9R0230	Landscape Characterization, Mapping and Ecological Assessment of Midwestern Water Bodies in the Future Midwest Landscape	09/12	10/16	03/30	\$50,386.00
209RD024R RS9R0240	Determining the Effects of Hydrodynamic and Watershed Land Cover Change on Major Tributaries to the Great Rivers – Browser/ARCIMS Production	10/23	11/26	06/02	\$51,802.83
209RD025R RS9R0250	Landscape Baseline Data Preparation - Future Midwest Landscapes	04/03	04/30	06/05	\$23,831.15
209RD026R RS9R0260	Landscape Characterization, Mapping and Ecological Assessment of Midwestern Water Bodies in the Future Midwest Landscape	04/03	04/30	09/11	\$62,255.96
209RD027R RS9R0270	Ecosystems Services of Coastal Wetlands for the Conterminous U.S. – Mapping/GIS Products	05/05	06/04	09/11	\$76,799.39

<b>TASK</b>	<b>TITLE</b>	<b>WA ACCEPTED</b>	<b>TWP APPROVED</b>	<b>SUBMITTED DELIVERABLE OR INACTIVE</b>	<b>EPA LOF</b>
209RD028R RS9R0280	Data, Tools, Software Delivery for Great Rivers Tributaries Prior Work Assignments	06/24	07/29	08/16	\$3,568.10



## **ANNUAL PERFORMANCE AND PRODUCTIVITY REPORT**

The following Work Assignments were either photos only, overflights, report reproductions, costing only, map production, litigation support, or canceled:

20901003S	Fletcher's Paint Works and Storage, NH (photos only)
20902403S	Schermerhorn Creek Site, NY (photos only)
20902403S	PAS Irwin Dump, NY (photos only)
20902405S	Laurence Harbor Seawall, NJ (current overflight)
20902412S	General Color, NJ (other)
20903588S	Globe Fireworks, MD (photos only)
20903589S	Monumental Fireworks, MD (photos only)
20903593S	Globe Fireworks, MD (photos only)
20903595S	Port Huntington, Tri-State (current overflight)
20903597S	Stillwater, VA (photos only)
20904540S	Sonford Products, MS (other)
20904541S	National Fireworks, TN (other)
20904542S	Southern Pine Wood Preserving, MS (photos only)
20904543S	Aberdeen Contaminated Groundwater, NC (photos only)
20904544S	Richards Metla Plating Site, AL (photos only)
20904545S	B.F. Goodrich, KY (report reproduction)
20905621S	Atlas Powder (Dupont), MI (photos only)
20905622S	PMC Groundwater, MI (current overflight)
20906004S	Marion Pressure Treating, LA (photo support)
20906005S	Van der Horst USA Corporation, TX (photo support)
20906006S	Cleveland Mills, NM (current overflight)
20906007S	Sand Springs Petrochemical Complex, OK (current overflight)
20906009S	Ruston Foundry, LA (current overflight)
20906010S	Imperial Refining Company, OK (current overflight)
20909962S	Iron King/Humboldt Smelter, AZ (other)
20909964S	Santa Susana, CA (technology transfer)

The following Work Assignments were not completed prior to this reporting period and will be reported after completion in the next Annual Summary Report:

20902409S	NL Industries, NY
20902411S	Pohatcong Valley Groundwater, NJ
20903596S	Carr China, WV
20904546S	Illinois Central Railroad Johnston Yard, TN
20909963S	Santa Susana Field Laboratory, CA
209RD006R	Landscape Investigations For Pesticides And Nutrients: GIS and Remote Sensing Support
209RD015R	Software Evaluation And Application Of Lidar-Based Digital Elevation Models
209RD027R	Ecosystems Services Of Coastal Wetlands for The Conterminous U.S. - Mapping/GIS Products

## ABSTRACT

ESD-LV PIC-20801102S/20901102S

### AERIAL PHOTOGRAPHIC ANALYSIS OF COMMERCE STREET PLUME SITE

Williston, Vermont

This report presents the findings from a historical aerial photographic analysis of the Commerce Street Plume site located near Kirby Corner, Chittenden County, Vermont. To perform the analysis, ten years of historical black-and-white, color, and color infrared aerial photographs were obtained to cover the period from 1937 through 2004. Efforts to procure photographs between the years 1943 through 1971 were unsuccessful. For the historical aerial photographic analysis, ten years of photography were analyzed, of which eight years were reproduced for inclusion in this report. The purpose of the historical aerial photographic analysis is to document environmentally significant activities, including changes to landscape morphology, patterns of hazardous waste disposal, and other observable conditions of environmental significance at this 15.5-hectare (38-acre) site. This report provides operational remote sensing information in support of remedial actions conducted by the Region 1 Office of the U.S. Environmental Protection Agency (EPA) under the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA). This report is produced in two formats, a standard 11" x 12" format and an oversized 17" x 22" format. The oversized report is presented in two volumes: the first volume includes the text descriptions and photographic analyses, while the second volume contains the aerial photographs and interpretive overlays.

According to collateral information (EPA, 2008), contaminants have been identified in the groundwater beneath the Commerce Street Plume site. Historical records indicate former manufacturing and/or fabrication operations contributed to groundwater contamination. Of specific concern to EPA is the identification of disposal activities onsite and along Kirby Lane located west of the site. Also of concern to EPA is the identification of an onsite unlined wastewater lagoon and leach field, and also the location of an onsite groundwater divide. None of these features were positively identified during this historical aerial photographic analysis of the Commerce Street Plume site. Other findings from the analysis revealed no buildings were onsite in 1937 or 1942. In 1972 seven buildings were located onsite. Activity within most of these buildings was probably small-scale manufacturing, parts, or supply outlets. The number of buildings onsite increased throughout the analysis, and in 2004, a total of twenty-one buildings were identified. Business operations within these buildings included small warehouses, professional office space, supply outlets, automotive repair, and light manufacturing. Throughout the study period, stains, possible stains, disturbed ground, ground scars, and possible dark-toned material were noted in association with the buildings. A cleared area was utilized as a staging area and a possible pit was noted. A linear trench was seen at a second cleared area and possible liquid leakage was noted from rectangular-shaped objects. All film used during this analysis was acquired during leaf-on conditions, thereby obscuring conditions and features below the tree canopy.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 1 Superfund Division in Boston, Massachusetts, and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.

## ABSTRACT

ESD-LV PIC-20901104S

### AERIAL HISTORICAL PHOTOGRAPHIC ANALYSIS, LAND USE/LAND COVER ANALYSIS, AND WETLANDS/DRAINAGE ANALYSIS OF CENTREDALE MANOR RESTORATION PROJECT STUDY AREA

Johnston, Rhode Island

This report presents the results of three aerial photographic analyses of the Centredale Manor Restoration Project study area in Johnston, Rhode Island. These analyses include a historical photographic analysis, a land use/land cover analysis, and a wetlands/drainage analysis of the study area. The study area covers approximately 40 hectares (100 acres) along the west side of Lyman Mill Pond and contains residential, commercial, mixed forest, and wetland/upland within the Woonasquatucket River basin. The study area is bounded to the north by Allendale Way, to the west by State Route 128, to the south by Lyman Avenue and on its east side by the approximate center of Lyman Mill Pond.

Of specific interest to the Region 1 Office of the U.S. Environmental Protection Agency (EPA) are portions of the wetlands, on the west shore of Lyman Mill Pond, that were filled as a result of man-made activities. The three aerial photographic analyses presented in the report, funded under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), were prepared to determine when these wetland areas were filled and whether the fill contained any waste materials. The report will aid EPA field investigators to develop field sampling strategies.

For the historical photographic analysis, nine dates of historical aerial photographs, spanning the period from 1951 through 2006, were reviewed and selected for inclusion in this report. The findings of the historical photographic analysis indicate that by 1951 no development had occurred on the west side of the railroad track that runs along the west perimeter of Lyman Mill Pond. A solid waste disposal facility was noted near the north end and a sand and gravel quarry pit was observed in the central portion of the study area. By 1963 the railroad track had been abandoned and development had started along the western shore of Lyman Mill Pond. Two automobile junkyards had been established in the central portion of the study area. The northern junkyard had been expanded by filling and leveling wetland along the western shore of Lyman Mill Pond. By 1970 the sand and gravel quarry pits had merged to cover most of the central portion of the site. The northern junkyard had been enlarged by 1976 with additional filling and leveling of wetland along the western shore of Lyman Mill Pond. In addition a construction company in the southern portion of the study area had also filled and leveled land along the western shore of Lyman Mill Pond. Dark-toned mounded material, probable derelict tires, were noted at the northern junkyard along the west shore of Lyman Mill Pond in 1976, 1981, and 1995. The northern junkyard was partially dismantled by 2003. By 2006 the northern junkyard had been closed and was partially revegetated.

The land use/land cover analysis was performed using photography dated 1951 and 2006. Findings of the land use/land cover analysis determined that in 1951 the study area consisted of predominantly residential land use and undeveloped mixed forest land. Between 1951 and 2006 the establishment of commercial junkyard operations, the expansion of quarry excavations, and the construction of additional residences accounted for the largest changes in the land use/land cover. By 2006 quarry excavations and commercial junkyard operations had replaced large sections of the undeveloped mixed forest land observed in 1951.

The wetlands/drainage analysis was performed using photography dated 1951, 1963, and 2006. Findings of the wetlands/drainage analysis determined that portions of the wetlands along the western shore Lyman Mill Pond and along other drainages, were filled as a result of commercial and residential development.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 1 Hazardous Waste Management Division in Boston, Massachusetts, and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.



## ABSTRACT

ESD-LV PIC-20901105S

### AERIAL PHOTOGRAPHIC ANALYSIS OF RHOADES SALVAGE/ABC METALS

Milton, Vermont

This report presents the findings from a historical aerial photographic analysis of Rhoades Salvage/ABC Metals (Site) located near Milton, Chittenden County, Vermont. To perform the historical aerial photographic analysis, ten years of historical black-and-white, color, and color infrared aerial photographs were obtained and analyzed to cover the period from 1971 through 2006. Eight years of photography were reproduced for inclusion in this report. The purpose of the historical aerial photographic analysis is to document landscape morphology, patterns of hazardous waste disposal, and identify past boundary limits for future site investigations. This report provides operational remote sensing information in support of removal actions conducted by the Region 1 Office of the U.S. Environmental Protection Agency (EPA) under the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA). This report is presented in two volumes: the first volume includes the text descriptions and photographic analyses, while the second volume contains the aerial photographs and interpretive overlays.

Collateral information supplied by Region 1 states Rhoades Salvage/ABC Metals has been used as a junkyard since the early 1950s to store, collect, and resell various metal items including automobiles. Groundwater tests have revealed elevated levels of heavy metals, including barium, cadmium, chromium, arsenic and lead. Sediment testing at nearby Hobbs Pond has revealed the presence of gasoline additives, vehicle coolants, and hydraulic fluids.

Findings from the historical aerial photographic analysis of the Rhoades Salvage/ABC Metals site revealed a junkyard operated on the site throughout the analysis period. Derelict vehicles, a tire pile, scrap metal, debris, probable derelict storage tanks, stains, and probable trailers were identified at this junkyard.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 1 Superfund Division in Boston, Massachusetts, and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.

## ABSTRACT

ESD-LV PIC-20901106S

### HISTORICAL AERIAL PHOTOGRAPHIC ANALYSIS, LAND USE/LAND COVER ANALYSIS, SITE DISCOVERY INVENTORY ANALYSIS, WETLANDS/DRAINAGE ANALYSIS, AND FRACTURE TRACE ANALYSIS OF OLIN CHEMICAL SUPERFUND SITE

Wilmington, Massachusetts

This report presents the results of five aerial photographic analyses of the former Olin Chemical Superfund site located near Wilmington, Massachusetts. These analyses include a historical photographic site analysis, a land use/land cover analysis, a site discovery inventory analysis, a wetlands/drainage analysis, and a fracture trace analysis. This report is presented in two volumes, one which presents the text descriptions and analyses, the second the aerial photographs and interpretive overlays.

The Olin Chemical Superfund site covers approximately 20 hectares (50 acres) in a commercial/industrial zoned area approximately 1.6 kilometers (1 mile) south of Wilmington, Massachusetts. The site is bounded to the north by Eames Street, to the east and west by railroad tracks, and to the south by the Woburn corporate boundary. The region has gently rolling terrain and a shallow groundwater level such that wetlands are observed to the north, east, south, and west of the site.

Of specific interest to the Region 1 Office of the U.S. Environmental Protection Agency (EPA) are sources and pathways for potential contaminants entering the natural drainage system, especially the wetland system and aquifer associated with Maple Meadow Brook, which until 2003 was used as the primary water supply source for the town of Wilmington. These analyses, funded under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), were prepared to determine potential sources and pathways of pollutants threatening the natural drainage system and drinking water supplies. The report will aid EPA field investigators to develop field sampling strategies.

For the historical photographic site analysis seventeen dates of aerial photographs, spanning the period 1952 through 2004, were reviewed and ten dates were selected for inclusion in this report. The findings of the historical photographic analysis site show that the Olin Chemical Superfund site, which was active by 1960, operated numerous processing/storage tanks, processing buildings, a drum handling area, and liquid waste ponds/pits. Various waste pits, ponds, lagoons, and landfill areas were operated over the life of the chemical plant. By 1978 a landfill had been established in the southwestern corner of the site. The landfill was closed and recontoured by 1991. By 1991 several buildings and structures at the site were dismantled and two lagoons had been closed and buried. By 2004 a large containment area had been constructed across an area formerly occupied by two lagoons that had been closed by 1991.

The land use/land cover, site discovery inventory, and wetlands/drainage analyses were conducted for a study area that surrounds the Olin Chemical Superfund site. This study area is bounded to the east by Interstate 93, to north by Butters Row Road and Lowell Street, to the west by Chestnut Street, and to the south by Merrimac Street. The land use/land cover, site discovery inventory, and wetlands/drainage analyses were performed using historical aerial photography dated 1960 and 2004.

Findings of the land use/land cover analysis determined that in 1960 the study area consisted of residential land, commercial and industrial land, wooded land with wetlands and ponds/lakes, agricultural land, and transitional land. By 2004 the both commercial land use and residential land use had significantly increased while agricultural land and wooded

land had significantly been reduced.

The findings of the site discovery inventory analysis for the period 1960 and 2004 revealed the predominant

development was in commercial retail, warehousing, and commercial services. Two large landfill operations were observed over the period 1960 through 2004.

Findings of the wetlands/drainage analysis, conducted using 1960 and 2004 aerial photographs, indicated that the largest extent of wetlands within the study area located west of the Olin Chemical Superfund site along Maple Meadow Brook. The Maple Meadow Brook wetlands do not receive surface drainage from the site. The wetlands southeast of the site, situated between Woburn Street and Interstate 93, are within the Aberjona River watershed and can receive potentially contaminated runoff from the site. Between 1960 and 2004 the extent of both wetlands west and southeast of the site have been impacted by land filling and development activities.

The fracture trace analysis was performed on the Olin Chemical Superfund site and the area surrounding the site. The analysis was conducted using black-and-white aerial photographs acquired in 1963 and 1978. A total of eight fracture traces were identified.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 1 Hazardous Waste Management Division in Boston, Massachusetts, and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.

## ABSTRACT

ESD-LV PIC-20902402S

### AERIAL PHOTOGRAPHIC ANALYSIS CORNELL-DUBILIER ELECTRONICS SITE

South Plainfield, New Jersey

A historical aerial photographic analysis of the Cornell-Dubilier Electronics Site, South Plainfield, New Jersey, was conducted to provide operational remote sensing support to field investigations of the U.S. Environmental Protection Agency (EPA) Region 2 under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), (EPA ID# NJD981557879). The analysis was conducted to document landscape morphology, patterns of waste disposal, and other observable activities and conditions of environmental significance at this Superfund Remedial hazardous waste site.

The Cornell-Dubilier Electronics Site is located in South Plainfield, Middlesex County, New Jersey and consists of approximately 10.5 hectares (26 acres). According to collateral information, the site was an unregulated industrial waste disposal site.

Thirty-three dates of aerial photographs, covering the period from 1940 through 2002, were acquired and analyzed for this report and ten of these aerial photographs were reproduced for inclusion in this report. Environmentally significant features noted on site included a disposal area that was in use from at least 1940 through at least 1979 and an outfall from which light-toned effluent was discharged into Bound Brook from at least 1947 through at least 1959.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 2 in New York, New York and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.

## ABSTRACT

ESD-LV PIC-20902406S

### AERIAL PHOTOGRAPHIC ANALYSIS RICHMOND TERRACE SITE

Staten Island, New York

This report presents the results of a historical aerial photographic analysis of the Richmond Terrace site (CERCLIS EPA ID: NYC200400190) that was conducted to provide operational remote sensing support to field investigations of the U.S. Environmental Protection Agency (EPA) Region 2 under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). The analysis documents landscape morphology, patterns of waste disposal, and other observable activities and conditions of environmental significance at this Superfund hazardous waste site.

The Richmond Terrace site is located in Richmond County, New York and comprises approximately eight hectares (19.8 acres). According to collateral information, African Metals used this site in the 1940s for the off-loading of Manhattan Engineering District materials that included high-grade uranium ores.

Twenty-one dates of aerial photographs, covering the period from 1940 through 2003, were acquired and analyzed for this report and nine of these aerial photographs were reproduced for inclusion in this report. Environmentally significant features noted on site included vertical tanks, a horizontal tank, probable horizontal tanks, staining, probable containers, open storage, light-toned material, debris, and two fill areas.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 2 in New York, New York and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.

## ABSTRACT

ESD-LV PIC-20902407S

### AERIAL PHOTOGRAPHIC ANALYSIS OF GENERAL COLOR SITE

Camden, New Jersey

This report presents the results of an aerial photographic analysis of the General Color site. The site covers approximately 2.5 hectares (6 acres) and is located near the intersection of North 31st Street and Lemuel Avenue, in Camden, New Jersey. The Region 2 Office of the U.S. Environmental Protection Agency (EPA) requested this aerial photographic analysis support under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to develop field sampling strategies at this site and aid field investigators. Historical aerial photographs, spanning the period from 1940 through 2008, were reviewed and ten dates (1940, 1951, 1963, 1967, 1976, 1982, 1990, 2002, 2006, and 2008) were selected for inclusion in this report.

Collateral information states that the site was operated by H. Kohnstamm & Company as early as 1922 and manufactured various food, drug, and cosmetic colorants, organic pigments, and dispersions. The company name was changed to Sensient Colors, Inc. prior to becoming General Color. By 1967 Pleasant Gardens Apartments, a low rise apartment building complex of nineteen buildings, had been constructed on Pleasant Street across from the site. Manufacturing operations ceased in 1997 and in 1998 the EPA performed an Expedited Removal Assessment at the site. By 2001 the EPA had been authorized to conduct remediation on the site. In association with cleanup operations, drilling and sampling identified a historic landfill at the site where solid and industrial waste had been buried (EPA, 2008).

The findings of the aerial photographic analysis of the General Color site show the chemical manufacturing facility on the site was operational in 1940, the earliest photo coverage used in this analysis, through 2001. As early as 1940 the facility contained numerous processing buildings and associated storage tanks. At that time the site was situated within a natural drainageway that directed surface flow northwest to the Delaware River. In 1940 through 1963, widespread filling activity was observed adjacent to and to the south of the site raising the ground level and filling the drainageway. Waste material was also noted next to the site and poor housekeeping practices within the facility were present during this period. By 1967 the Pleasant Gardens Apartments had been constructed south of the site along Pleasant Street. Analysis of the 1976 photo revealed the presence of a large drum handling and storage area near the southwest corner of the General Color site facility. The area contained 55-gallon drums stacked on pallets, scattered damaged drums, piles of empty and dilapidated crates, containers, and debris. In 1982 no railroad cars or trucks were noted at facility and several storage tanks had been dismantled. By 1990 the facility had been partially dismantled and its railroad loading platform removed. In 2002 the facility was no longer operational, several buildings had been dismantled and large piles of fill were observed on the south side of the site. By 2006 all of buildings, storage tanks, and structures had been dismantled and removed. A portion of the site had been filled and graded and large piles of fill occupied much of the site. By 2008 the General Color site had become a residential neighborhood of twenty-nine duplex houses with grassy lawns and recently constructed, paved driveways that connect to Lemuel Avenue and North 31st Street.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 2 Hazardous Waste Management Division in New York, New York, and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.

## ABSTRACT

ESD-LV PIC-20902408S

### AERIAL PHOTOGRAPHIC ANALYSIS OF ATLANTIC STATES CAST IRON PIPE SITE

Alpha, New Jersey

This report presents the results of a historical aerial photographic analysis of the Atlantic States Cast Iron Pipe site, located in Alpha, New Jersey. In this report, the site has been divided into two separate study areas (Study Area A and B). The areal extent of Study Area A, located near Hobson and Vulcanite Roads, is estimated at approximately 28 acres (11 hectares). The areal extent of Study Area B, located adjacent to Industrial Road, is estimated at approximately 68 acres (27.5 hectares). Ten years of historical aerial photographs for the period from 1939 through 2008 are contained in this report. The U.S. Environmental Protection Agency (EPA) Region 2 Office requested operational remote sensing support to document observable past patterns of waste disposal activity and other conditions of environmental significance for remedial operations under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

The historical aerial photographic analysis of the Atlantic States Cast Iron Pipe site identified two industrial ruins, an extraction pit, and a waste disposal area in Study Area A. In addition, during the course of the study period, the following environmentally significant features and conditions were also identified in Study Area A: impoundments, possible horizontal tanks, possible open storage areas, possible debris, disturbed ground, staining, light-toned material, light-toned mounded material, and medium-toned mounded material.

Two industrial facilities, an extraction pit, a probable waste disposal area, and a junkyard were identified in Study Area B. In addition, the following environmentally significant features and conditions were also identified in Study Area B: emission stacks, silos, vertical tanks, open storage areas, possible staining, fill areas, a possible trench, light-toned material, light-toned mounded material, medium-toned mounded material, dark-toned material, possible debris, disturbed ground, staining, light-toned material, light-toned mounded material, and medium-toned mounded material.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 2 Hazardous Waste Management Division in New York City, New York, and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.

## ABSTRACT

ESD-LV PIC-20902410S

### AERIAL PHOTOGRAPHIC ANALYSIS OF CINNAMINSON GROUNDWATER CONTAMINATION SITE AND STUDY AREA

Cinnaminson, New Jersey

This report presents the results of a historical aerial photographic analysis of the Cinnaminson Groundwater Contamination site (CERCLIS EPA ID: NJD980785638) and study area that was conducted to provide operational remote sensing support to field investigations of the U.S. Environmental Protection Agency (EPA) Region 2 under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). The analysis documents landscape morphology, patterns of waste disposal, and other observable activities and conditions of environmental significance at this Superfund hazardous waste site.

The Cinnaminson Groundwater Contamination site and study area are located in Burlington County, New Jersey. The site comprises approximately 48 hectares (119 acres). The site and study area were analyzed by EPA in 1986 (see references) utilizing aerial photographs from 1940 through 1984. The current report analyzes the site and study area for the subsequent period through 2008. In addition, the study area surrounding the Cinnaminson Groundwater Contamination site that was analyzed for the 1986 report has been expanded for the current report and the added area is analyzed from 1940 through 2008.

Thirty dates of aerial photographs, covering the period from 1940 through 2008, were acquired and analyzed for this report and photographs from nine of these dates were reproduced for inclusion in this report. Environmentally significant features noted on site included fill areas, excavations resulting from sand and gravel extraction, a facility area with equipment, and open storage of drums and probable equipment. Environmentally significant features noted in the inventory study area included treatment plants, an electrical substation, impoundments, excavations, horizontal tanks, vertical tanks, fill areas, debris, drums, containers, disturbed ground, ground scars, mounded material, and open storage areas.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 2 in New York, New York and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.



## ABSTRACT

ESD-LV PIC-20903590S

### AERIAL PHOTOGRAPHIC ANALYSIS OF CATOCTIN MOUNTAIN NATIONAL PARK

Thurmont, Maryland

This report presents the findings from a historical aerial photographic analysis of Catoctin Mountain National Park (Site) located near Thurmont, Frederick County, Maryland. To perform the historical aerial photographic analysis, four years of historical black-and-white aerial photographs were obtained to cover the period from 1937 through 1952. These years of photography were analyzed and reproduced for inclusion in this report. The purpose of the historical aerial photographic analysis is to document landscape morphology, patterns of hazardous waste disposal, and other observable conditions of environmental significance at this site. This report provides operational remote sensing information in support of remedial actions conducted by the Region 3 Office of the U.S. Environmental Protection Agency (EPA) under the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA).

Findings from the historical aerial photographic analysis revealed a total of four well-organized camps comprised of buildings, cabins, and sheds operating on the site. One camp also included a possible security checkpoint. Possible debris and possible standing liquid were noted near a probable light-industrial facility in 1937, but this facility was dismantled by 1943. Two possible migrant worker campsites were seen in 1943. Ground scars, possibly indicating waste disposal activity at these campsites were noted. These campsites were abandoned by 1952. A possible military training facility was in place by 1943. Adjacent to it were numerous ground scars and a trench. By 1952, many of the buildings were removed and the trench was filled. Probable solid waste and debris could be seen near the possible military training facility in 1952.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 3 Superfund Division in Philadelphia, Pennsylvania, and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.

## ABSTRACT

ESD-LV PIC-20903591S

### HISTORICAL AERIAL PHOTOGRAPHIC ANALYSIS, LAND USE/LAND COVER ANALYSIS, SITE DISCOVERY INVENTORY ANALYSIS, WETLANDS/DRAINAGE ANALYSIS, AND FRACTURE TRACE ANALYSIS OF CHEM FAB SUPERFUND SITE

Doylestown, Pennsylvania

This report presents the results of five aerial photographic analyses of the Chem Fab Superfund site in Doylestown, Bucks County, Pennsylvania. These analyses include an historical aerial photographic analysis, a land use/land cover analysis, a site discovery inventory analysis, a wetlands/drainage analysis, and a fracture trace analysis. This report is presented in two volumes, one which presents the text descriptions and analyses, the second the aerial photographs and interpretive overlays. The report provides operational remote sensing information in support of remedial actions conducted by the Region 3 Office of the U.S. Environmental Protection Agency (EPA) under the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA).

Collateral information supplied by Region 3 states the Chem Fab Superfund site operated as an electroplater from 1965 until the early 1990s. Chem Fab was cited by the EPA for illegal dumping of waste materials around the property and into nearby Cooks Run. The EPA suspects illegal dumping continued through the 1980s. In 1994 and 1995, the EPA removed badly deteriorated tanks and drums. There are also reports that a leaking underground storage tank was removed without consent from either the EPA or the Pennsylvania Department of Environmental Protection.

To perform the historical aerial photographic analysis, thirteen years of historical black-and-white, color, and color infrared aerial photographs were obtained to cover the period from 1958 through 2005. Nine years of photography were analyzed and reproduced for the historical aerial photographic analysis. The purpose of this historical aerial photographic analysis is to identify potential sources of contamination and patterns of hazardous waste disposal for site characterization and development of future remedy plans. Findings of the analysis of the Chem Fab Superfund site revealed an active industrial facility in 1971. Vertical storage tanks, horizontal storage tanks, drums, stains, open storage areas, probable scrap metal and debris were identified on the site during the analysis. In addition, a possible man-made drainage channel, originating near the storage tanks, was observed. This channel directed runoff northwest from the site and into Cooks Run. Probable and possible vegetation stress was noted adjacent to the drainage channel from 1971 through 1978. Three areas-of-interest and a waste treatment facility were located adjacent to the site. Visible features at these four areas throughout the analysis period included drums, solid waste, debris, stains, storage tanks, crates, containers, mounded material, an impoundment containing liquid, and heavy equipment.

The land use/land cover analysis was performed by analyzing aerial photography taken in 1958 and 2005 of a study area that encompasses the area within an approximate one mile (1.6 kilometers) radius of the center of the Chem Fab Superfund site. Findings of the land use/land cover analysis determined that in 1958 the study area consisted of predominantly residential and agricultural land use. A few industrial facilities were also operating. By 2005, almost all of the agricultural land, and most of the industrial complexes gave way to residential and commercial expansion.

The site discovery inventory analysis was performed for a study area that encompasses the area within an approximate one mile (1.6 kilometers) radius of the center of the Chem Fab Superfund site. This analysis was performed using black-and-white aerial photographs acquired in 1958, 1971, 1988, and 2005. Findings of this analysis are placed on an overlay registered to the 2005 image. The significant findings of the site discovery inventory document the presence of

fourteen noteworthy environmentally significant sites within the study area. These sites include a waste treatment facility, CAFOs (Confined Animal Feeding Operations), industrial establishments, and a highway maintenance facility.

The wetlands/drainage analysis was performed for a study area that encompasses the area within an approximate three-quarter mile (1.2 kilometers) radius of the center of the Chem Fab Superfund site. This analysis was performed using black-and-white aerial photographs acquired in 1958 and 1999. Small ponds, wetlands, and drainage pathways were identified proximal to the site.

The fracture trace analysis was performed using black-and-white aerial photographs acquired in 1958 and 1964 for a study area within an approximate one mile (1.6 kilometers) radius of the Chem Fab Superfund site. A total of seven fracture traces were identified in proximity to the site.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 3 Superfund Division in Philadelphia, Pennsylvania, and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.

## ABSTRACT

ESD-LV PIC-20903592S

### AERIAL PHOTOGRAPHIC ANALYSIS OF BORIT ASBESTOS SITE

Ambler, Pennsylvania

This report presents the results of a historical aerial photographic analysis of the Borit Asbestos site (CERCLIS EPA ID: PAD981034887) that was conducted to provide operational remote sensing support to field investigations of the U.S. Environmental Protection Agency (EPA) Region 3 under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). The analysis documents landscape morphology, patterns of waste disposal, and other observable activities and conditions of environmental significance at this Superfund hazardous waste site. A photogrammetric mensuration was performed on two disposal areas.

The Borit Asbestos site is located in Montgomery County, Pennsylvania and comprises approximately 12.6 hectares (31.1 acres). According to collateral information, the site was used to dispose of asbestos containing material beginning in the 1930=s.

Twenty-three dates of aerial photographs, covering the period from 1937 through 2004, were acquired and analyzed for this report and ten of these aerial photographs were reproduced for inclusion in this report. Environmentally significant features noted on site included disposal areas, a liquid-filled impoundment, and open storage areas with horizontal tanks, probable drums, and crates.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 3 in Philadelphia, Pennsylvania and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.

## ABSTRACT

ESD-LV PIC-20903594S

### AERIAL PHOTOGRAPHIC ANALYSIS OF KELLETT AIRCRAFT CORPORATION SITE

Willow Grove, Pennsylvania

This report presents the results of a historical aerial photographic analysis of the Kellett Aircraft Corporation site, located in Willow Grove, Pennsylvania. The areal extent of the site, as depicted in this report, is estimated at 5.2 hectares (12.8 acres). Ten years of historical aerial photographs for the period from 1942 through 2004 are contained in this report. The U.S. Environmental Protection Agency (EPA) Region 3 Office requested operational remote sensing support to document observable past patterns of waste disposal activity and other conditions of environmental significance for remedial operations under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

According to EPA collateral information, operations at the Kellett Aircraft Corporation site may have contributed to the trichloroethylene (TCE) groundwater issue at the nearby Willow Grove Naval Air Station. An EPA Site Inspection, which showed elevated levels of metals throughout the site, was performed on September 30, 1987. In 1990, a Phase I Environmental Site Assessment was performed by the facility with similar results as the 1987 Site Investigation. In 2000, additional sampling was conducted by the facility as part of a real estate transfer. A commercial operation currently occupies the site, and there are plans to construct a day care facility on the site.

The significant findings of the historical aerial photographic analysis of the Kellett Aircraft Corporation site indicate that industrial and/or commercial operations took place on the site from at least 1958 to 2008. A light-industrial facility consisting of three contiguous buildings was constructed on the site sometime between 1950 and 1958. Industrial operations were primarily observed on the east and south sides of the facility.

Over the course of the study period, the following environmentally significant features and conditions were observed on the site: drums, vertical tanks, horizontal tanks, staining, possible liquid waste, a fill area, open storage areas, a drainage outfall, disturbed ground, ground scarring, light-toned material, medium-toned material, mounded material, debris, crates, and cleared areas.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 3 Hazardous Waste Management Division in Philadelphia, Pennsylvania, and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.

## ABSTRACT

ESD-LV PIC-20906008S

### FRACTURE TRACE ANALYSIS AND DRAINAGE ANALYSIS OF OKLAHOMA REFINING COMPANY SITE

Cyril, Oklahoma

This report presents the results of a fracture trace analysis and a drainage analysis of the Oklahoma Refining Company site located in Cyril, Caddo County, Oklahoma. According to collateral information groundwater contamination has been found at the Oklahoma Refining Company site and in Gladys Creek that borders the site (EPA, 2009). The U.S. Environmental Protection Agency (EPA) Region 6 Office requested operational remote sensing to aid with the long-term ground water and surface water monitoring of the site under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

The fracture trace analysis was performed on the Oklahoma Refining Company site and the area surrounding the site. The analysis was conducted using black-and-white aerial photographs acquired in 1940, 1948, and 1981. A total of 10 fracture traces were identified.

A drainage analysis was also performed on the Oklahoma Refining Company site and the surrounding area. Drainage channels and impoundments were mapped using nine dates of aerial photographs.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 6 Superfund Division in Dallas, Texas, and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.

## ABSTRACT

ESD-LV PIC-20907006S

### AERIAL PHOTOGRAPHIC ANALYSIS OF CAMERON MISSOURI INVESTIGATION STUDY AREA

Cameron, Missouri

This report presents the results of a historical aerial photographic analysis of the Cameron Missouri Investigation study area, located in Cameron, Missouri. The areal extent of the study area, as depicted in this report, is estimated at approximately 12 square miles. Eight years of historical aerial photographs for the period from 1940 through 2004 are contained in this report. The U.S. Environmental Protection Agency (EPA) Region 7 Office requested operational remote sensing support to document observable past patterns of waste disposal activity and other conditions of environmental significance for remedial operations under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This report is presented in two volumes: the first volume includes the text descriptions and photographic analyses, while the second volume contains the aerial photographs and interpretive overlays.

The historical aerial photographic analysis of the Cameron Missouri Investigation study area identified several industrial areas, an industrial facility at the Rockwool Industries site, a waste disposal area, an open dump site, and two extraction areas.

Over the course of the 1940-2004 study periods, industrial areas were observed on U.S. Route 36 (West Grand Avenue) in the northern portion of Cameron, along the railroad that traverses the central portion of Cameron, and on U.S. Route 69 in the southern portion of Cameron. Commercial/industrial operations were also observed to the north and northwest of Cameron, adjacent to U.S. Route 34 and U.S. Route 69.

During the course of the study period, an industrial facility that reportedly manufactured fiber insulation operated on the Rockwool Industries site. The facility was first observed in 1976, and appeared to be active through 2004. However, collateral information states that Rockwool Industries only operated at the site from 1974-1982.

A waste disposal area was observed on the east side of the sewage disposal plant located in the southeastern portion of Cameron. The sewage disposal plant was located in close proximity to a primary drainageway for Cameron. Waste disposal activity was observed at the disposal area from 1957-1976. During that period, the open burning of waste material, surface dumping, and the probable burial of waste material in disposal trenches, were all noted at the disposal site.

In 2004, an open dump site was also identified in the northeastern part of Cameron, immediately south of U.S. Route 34. Six areas of possible solid waste and a subsurface storage tank were noted at the dump site.

Two extraction areas were also identified during the course of the study period. They were located immediately adjacent to one of the reservoirs in the northwestern portion of the study area, and appeared to be operational during the period from 1940-1976.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 7 Hazardous Waste Management Division in Kansas City, Kansas, and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.

## ABSTRACT

ESD-LV PIC-20809961S/20909961S

### AERIAL PHOTOGRAPHIC ANALYSIS OF IRON KING MINE/HUMBOLDT SMELTER SITE

Dewey-Humboldt, Arizona

This report presents the findings from a historical aerial photographic analysis of the Iron King Mine/Humboldt Smelter site located near Dewey-Humboldt, Arizona. The site comprises the Iron King Mine and the Humboldt Smelter. The analysis was performed using fourteen (14) dates of historical black-and-white, color, and color infrared aerial photographs that cover the period from 1940 through 2003. For the historical aerial photographic analysis, all fourteen (14) dates of photography were analyzed, and eight (8) dates were selected for reproduction and inclusion in this report. The purpose of the historical aerial photographic analysis is to document the nature, extent, and location of contaminants and other observable conditions of environmental significance at the Iron King Mine and the Humboldt Smelter. This report provides operational remote sensing information in support of remedial actions conducted by the Region 9 Office of the U.S. Environmental Protection Agency (EPA) under the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA). This report is presented in two volumes: the first volume includes the text descriptions and photographic analyses, while the second volume contains the aerial photographs and interpretive overlays.

According to collateral information supplied by the EPA, the Iron King Mine, located west of Highway 69 and west of Humboldt, Arizona, operated from the late 1800s through approximately the 1970s. A portion of the mine was also used by a fertilizer manufacturing facility. The Humboldt Smelter, located east of Highway 69 and south of Humboldt, was used as a smelter from the early 1900s through approximately 1960 and may have been used intermittently after that date for smelting and other purposes. Tailings have been periodically released from the Iron King Mine down through the Chaparral Gulch extending to the Humboldt Smelter.

Findings from the historical aerial photographic analysis of the Iron King Mine/Humboldt Smelter site indicate that an ore processing facility and two processing facilities operated on the Iron King Mine section of the site during the time frame of the analysis. The ore processing facility was composed of processing buildings, tanks, overhead pipes, and tailings ponds, and was active in 1940 through at least 1964. Processing facility PF-1 was active in 1940 through at least 1980. Processing facility PF-2 was active in 1992 through at least 2003. Waste materials generated from the facilities appear to have entered the tributaries of the Chaparral Gulch and the Galena Gulch.

Evidence that ore processing had occurred on the Humboldt Smelter section of the King Mine/Humboldt Smelter site prior to 1940 was found. Ore Processing Facility-1 was operational in 1964 through at least 1970. Tailings ponds and dumping of materials were observed near the facility. Ore Processing Facility-2 did not appear to be active during the time frame of the analysis. However, the extent of light-toned material, located along a hillside that slopes to the Chaparral Gulch, did increase between 1940 and 1953. Waste materials generated from Ore Processing Facility-1 appear to have entered the Agua Fria River and waste materials generated from Ore Processing Facility-2 appear to have entered the Chaparral Gulch.

The EPA Environmental Sciences Division, Landscape Ecology Branch in Las Vegas, Nevada, prepared this report for the EPA Region 9 Superfund Division in San Francisco, California, and the EPA Office of Superfund Remediation Technology Innovation in Washington, D.C.



## ABSTRACT

ESD-LV PIC-209RD018R

### LANDSCAPE CHARACTERIZATION, MAPPING AND ECOLOGICAL ASSESSMENT OF WATERSHEDS IN THE VICINITY OF RECREATIONAL WATERS

Lockheed Martin acquired conterminous U.S. CAFOs data points, STORET water quality points, and supporting GIS datasets. From these data, CAFO point source flowlines were generated and analyzed for intersection with potential recreational waters areas. Candidate recreational waters were identified and analyzed for STORET water quality data in the vicinity of the recreational waters. The candidate recreational water's watersheds were delineated and landscape metrics were generated. Analysis results were compiled into GIS projects and formatted to KMZ for viewing in Google Earth. A draft website was created to present and distribute the project results. Coastal area (marine and Great Lakes) NHDPlus catchments were extracted and landscape metrics were generated for these areas.

## ABSTRACT

ESD-LV PIC-209RD020R/209RD025R

### FUTURE MIDWEST LANDSCAPES - BASELINE DATA PREPARATION

Using the technical guidance on methods development and projection scale provided by EPA, Lockheed Martin incorporated information on crop type and rotation into the NLCD-2001 land cover geodataset for the Future Midwest Landscapes (FML) study area. A crop yield grid was initially compiled using the existing SSURGO component crop yield data. To augment areas where crop data was unavailable, raw tabular data was requested and received from the USDA-NRCS state offices in North Dakota, Kansas, and Missouri for use in computing representative crop yields for SSURGO soil map units. Grids encompassing Midwest state, district, and county boundaries were used to assign data for various crop tillage, fertilizer, and pesticide parameters extracted from the USDA's NASS and ERS ARMS data tables. An application of a CDL-based rotation class scheme to the land cover grid data was made in a spatially explicit manner for the study area. LANDFIRE existing vegetation type data was incorporated to address natural areas. Supplemental geodatasets were prepared to support the linkages among the expanded land cover grids and the supporting Biofuels Target analytical data. Narrative text documenting the data processing steps used in the project was prepared for inclusion within a technical journal manuscript.

## ABSTRACT

ESD-LV PIC-209RD022R

### LANDSCAPE CHARACTERIZATION, MAPPING, AND ECOLOGICAL ASSESSMENT OF WATERSHED MODELS AND WETLANDS IN THE WILLAMETTE RIVER BASIN

Lockheed Martin provided a hydrology-nutrient model report. Date specific aerial photography and GIS datasets were acquired for the Calapooia river watershed within Willamette river basin. Existing geospatial datasets were processed and/or clipped to the study area extent including STATSGO and SSURGO soils. NWI wetlands and NHDPlus drainage networks were updated within the Calapooia watershed. Custom drainage networks were also delineated from date specific aerial photography within the study area.

## ABSTRACT

ESD-LV PIC-209RD023R/209RD026R

### LANDSCAPE CHARACTERIZATION, MAPPING AND ECOLOGICAL ASSESSMENT OF MIDWESTERN WATER BODIES IN THE FUTURE MIDWEST LANDSCAPE

Lockheed Martin compiled and generated geospatial datasets for the Future Midwest Landscapes study area which encompasses the 4 state areas of MN, WI, IA, and IL. Several custom geospatial dataset were created for the study area, including spatial water bodies, lakes, and 1st and 3rd order sized watersheds. Existing geospatial datasets were also processed and/or clipped to the study area extent. Landscape metrics were generated for some of the study areas watersheds and catchments.

## ABSTRACT

ESD-LV PIC-209RD024R

### DETERMINING THE EFFECTS OF HYDRODYNAMIC AND WATERSHED LAND COVER CHANGE ON MAJOR TRIBUTARIES TO THE GREAT RIVERS - BROWSER/ARCIMS PRODUCTION

Lockheed Martin compiled GIS data for the Great Rivers Tributaries study area watersheds. These datasets were formatted for hydrologic modeling within the Vflo software. The outputs from the Vflo processing steps were analyzed for medium and maximum flood extent representations. The flood extents were utilized to generate land-cover effect of flood and change metrics within a 120 meter buffer from the tributaries main stem. Landscape metrics were also produced for the tributary watersheds. A website was created to present and distribute the project results.

## ABSTRACT

ESD-LV PIC-209RD028R

### DATA, TOOLS, SOFTWARE DELIVERY FOR GREAT RIVERS TRIBUTARIES PRIOR WORK ASSIGNMENTS

Lockheed Martin gathered required data, tools, and software used in previous Great Rivers Tributaries work assignments.

## APPENDIX 1

### TOTAL COST CONTRACT EP-D-05-088

Regional WA's:	44
Regional WA \$'s:	\$964,785.01
R&D WA's:	11
R&D WA \$'s:	\$747,090.19